Answer on Question#38507, Physics, Electric Circuits

A 240V mains has two secondary windings, one to provide 300V, the other to provide 6V. If there are 2000 turns on the primary, find the number of turns in the secondary windings.

Solution

The transformer can be connected such that secondary winding is divided into number sub windings, each driving an independent load at its ends.

Since all the coils primary are connected through a common iron core to their secondary coils, so due to Faraday's Law of Mutual Induction, each individual sub coil would have the same number of voltage per turn, that is, its ratio of primary turns to secondary would still be equal to the ratio of primary voltage to secondary voltage, as for a usual transformer.

$$\frac{V_P}{N_P} = \frac{V_{S1}}{N_{S1}} = \frac{V_{S2}}{N_{S2}}.$$

Here V_P - primary voltage, V_{S1} - secondary voltage of the first winding, V_{S1} - secondary voltage of the second winding, N_P - number of turns on the primary, N_{S1} - number of turns on the first winding, N_{S2} - number of turns on the second winding.

We have

$$N_{S1} = \frac{N_P}{V_P} V_{S1} = \frac{2000}{240} 300 = 2500,$$

$$N_{S2} = \frac{N_P}{V_P} V_{S2} = \frac{2000}{240} 6 = 50.$$

Answer: 2500 and 50.